

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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GOVERNOR

SECRETARY

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STATE PROJECT: 8.1581201 (R-3303)

COUNTY:

Richmond

DESCRIPTION:

NC 73 Extension from Existing NC 73 /US 220 To SR 1452

(Church St) Near Ellerbe

SUBJECT:

Geotechnical Report – Inventory

Project Description

The Geotechnical Unit subsurface investigation was conducted in August & September of 2002 with a CME 550 drill rig utilizing 8" hollow stem augers. The project is located in North-Central Richmond County at the northeastern edge of the Town of Ellerbe. From the intersection of US NC 73 and 220, a new section will extend 3.6 km to tie with T.I.P. project R-2231, the new U.S.220. The following lines were investigated:

Line	Station	to	Station	Total Length (in M)
-L-	8+49.941	to	44+57.51	3607.569
- Y1-	10+65.408	to	12+06.917	142.509
-Y2-	10+41.307	to	11+08.947	67.64
-Y3-	10+76.558	to	11+44.447	67.889
-Y4-	10+00	to	12+95.12	295.12
-Y5-	10+00	to	13+07.803	307.803
-Y6-	10+00	to	10+25	25.000

Total length of lines investigated was 4,512.53 meters or 4.5 kilometers.

Areas of Special Geotechnical Interest

Groundwater at or above grade

Possible perched groundwater on high P.I. sand, that occurs at grade on the latter half of the project, may lead to drainage or slow-drying soil problems. Groundwater was found above grade or within 2m below grade at the following locations, both associated with high PI intervals of the Coastal Plain "sand": Other high PI above grade intervals may exhibit transient wet weather seeps.

- -L- 15+80 to -L- 16+70,
- -L- 35+40 to -L- 40+50

Plastic soils

Intervals of soil that yielded P.I. (plasticity index) values of greater than 20 were found throughout the project. P.I values greater than 10 are posted on the profiles. High PI's were found in two general occurrences: 1.) A-7 residual clay soil at or above the top of the slate belt, near elevation 130m, and, 2.) A-2-6 and A-2-7 clayey sand within the Cretaceous stratigraphy.

High Plasticity Soil

Near elevation 136	-L- 12+00 to -L- 13+60,	at and above grade: clayey sand
Near elevation 136	-L- 15+00 to -L- 17+00,	at, above, and below grade: clayey sand
Near surface	-L- 31+00 to -L- 33+60,	at and below grade: clayey sand
Below elevation 128	-L- 33+80 to -L- 35+40,	below grade: residual silty clay
Above elevation 128	-L- 35+60 to -L- 37+00,	at grade: clayey sand
Below elevation 128	-L- 37+00 to -L- 37+20,	below grade: residual silty clay
Above elevation 128	-L- 37+20 to -L- 40+40,	at & below grade: clayey sand

Physiography and Geology

Physiography

The project is located at the eastern edge of the Piedmont Physiographic Province, but still within that province. Topography is characterized as rolling, with an aggregate relief across the project of 30m. Features of up to 4m relief will be filled (or cut) as appropriate, by the planned construction. The topographic high on the project is on the drainage divide in the Pee Dee Basin between Rocky Fork Creek and Little Mountain Creek. The project is in a "Protected water supply water shed", presumably for Rockingham.

The project is located at the western "feather-edge" contact of the Cretaceous Sand and the underlying Carolina Slate Belt rock. The 1985 geologic Map of North Carolina shows Cretaceous Middendorf, (Km) above the Slate Belt in this area. Tertiary age Pinehurst formation, (Tp) is mapped on the ridge-tops.

Our investigation is in general agreement with the geologic map. We found Slate Belt rock within 2m of the surface at the topographic lows that the alignment crosses. The Slate Belt is at elevation 131m at the beginning of the project and at elevation 125m at station –L-35+00. High plasticity clayey residual soil was found at the weathered upper limit of the Slate Belt. Toward the end of the project at station -L- 42+00, residual Slate Belt soil may be as high as elev. 131m, but drilling did not continue to rock in this project. Most of the drillholes found a meter thick layer of fine loose non-plastic sand at the surface that is consistent with description of the Pinehurst formation. The bulk of the sand section that was drilled is consistent with the description of the Cretaceous Middendorf formation.

Our drilling in the Middendorf found it to be largely A-2-7 and A-2-6, with laterally discontinuous intervals of A-6 and A-7, with higher P.I.'s as well as lower plasticity A-2-4 intervals. Some areas of high groundwater may be "perched" on higher plasticity. lower permeability beds, within the Middendorf. Possible perched groundwater on high plasticity sand that occurs at grade on the latter half of the project may lead to drainage or slow-drying soil problems. The drop of "N" values at the water table, seen in some of the borings, is sometimes interpreted as evidence for artesian pressure.

Soils Properties

The soil property descriptions are arranged from youngest to oldest by stratigraphic unit. The stratigraphic units are also lithologic units so there is not a lot of soil type overlap from unit to unit.

Quaternary Alluvial Soil

Sandy soil of less than 1m thickness was found associated with the unnamed wet weather draws. It is reworked from the surrounding sand deposits, and nearly undistinguishable from the Pinehurst Formation.